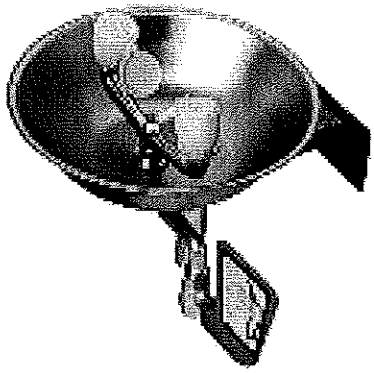
Emergency Eyewash and Shower Stations

Guidelines for installation, maintenance, and use



Note: since there is no Canadian standard for emergency showers and eyewash stations, the U.S. ANSI Standard Z358.1-2004 was used in preparing this document.

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What is considered to be a 'flushing fluid'?

The ANSI standard defines "flushing fluid" as any of potable (drinking) water, preserved water, preserved buffered saline solution or other medically acceptable solutions. Local laws may apply in some cases. This document will use the term "water" to mean any of these acceptable flushing fluids unless otherwise specified.

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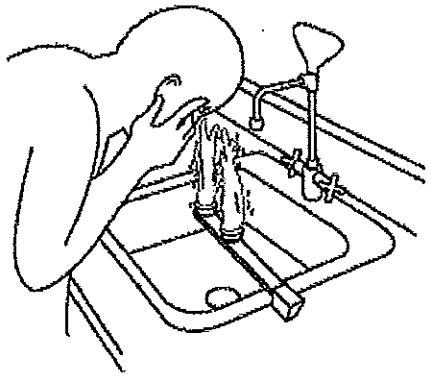
How long should the contact area be rinsed/flushed?



For emergency showers and eyewash stations to be effective, the American National Standards Institute (ANSI) Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-2004) recommends that the affected body part must be flushed immediately and thoroughly for at least 15 minutes using a large supply of clean fluid under low pressure. Water does not neutralize contaminants -- it only dilutes and washes them away. This fact is why large amounts of water are needed.

However, other references recommend a minimum 20-minute flushing period if the nature of the contaminant is not known. The flushing or rinsing time can be modified if the identity and properties of the chemical are known. For example:

- a minimum 5-minute flushing time is recommended for mildly irritating chemicals,
- at least 20 minutes for moderate-to-severe irritants,
- 20 minutes for non-penetrating corrosives, and
- at least 60 minutes for penetrating corrosives.

Non-penetrating corrosives are chemicals which react with human tissue to form a protective layer which limits the extent of damage. Most acids are non-penetrating corrosives. Penetrating corrosives, such as most alkalies, hydrofluoric acid and phenol, enter the skin or eyes deeply. Penetrating corrosives require longer water flushing (a minimum of 60 minutes) than non-penetrating corrosives (a minimum of 20 minutes).

In all cases, if irritation persists, repeat the flushing procedure. It is important to get

medical attention as soon as possible after first aid has been given. A physician familiar with procedures for treating chemical contamination of the eyes and body should be consulted.

Note: The total amount of water in self-contained systems should exceed the volume required to deliver water at the recommended flow rates and flushing times.

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What type of equipment should I install?

Emergency showers, also known as drench or deluge showers, are designed to flush the user's head and body. They should **not** be used to flush the user's eyes because the high rate or pressure of water flow could damage the eyes in some instances. Eyewash stations are designed to flush the eye and face area only. There are combination units available that contain both features: a shower and an eyewash.

The need for emergency showers or eyewash stations is based on the properties of the chemicals that workers use and the tasks that they do in the workplace. A job hazard analysis can provide an evaluation of the potential hazards of the job and the work areas. The selection of protection -- emergency shower, eyewash or both -- should match the hazard.

In some jobs or work areas, the effect of a hazard may be limited to the worker's face and eyes. Therefore, an eyewash station may be the appropriate device for worker protection. In other situations the worker may risk part or full body contact with dangerous substances. In these areas, an emergency shower may be more appropriate.

A combination unit has the ability to flush any part of the body or all of the body. It is the most protective device and should be used wherever possible. This unit is also appropriate in work areas where detailed information about the hazards is lacking, or where complex, hazardous operations involve many chemicals with different properties. A combination unit is useful in situations where there are difficulties handling a worker who may not be able to follow directions because of intense pain or shock from an injury.

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What specification should the equipment meet?

Note: All dimensions and measurements are taken from the American National Standards Institute (ANSI) standard Z358.1-2004 "Emergency Eyewash and Shower Equipment".

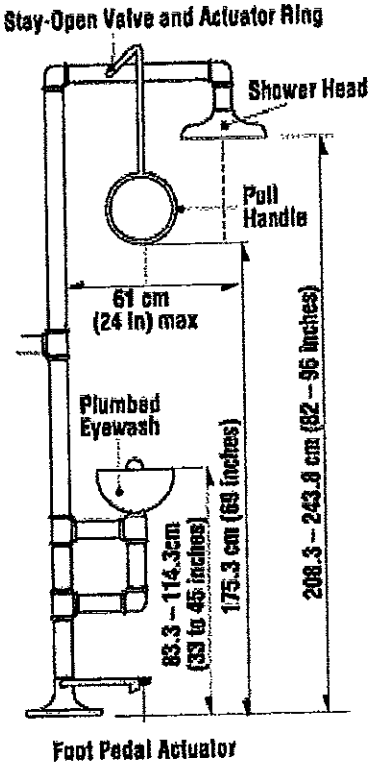
Although portable models are available, it is always a good practice to select a plumbed model whenever possible. Portable models should be able to deliver the same volumes of water, as well as meet the dimensions for plumbed models, as specified in the standard. However, portable stations are necessary for mobile crews, temporary locations, or when the plumbed model is under repair. In order to prevent any secondary eye infections, the water in self-contained models should be treated to prevent bacterial growth in the water itself. Changing the water supply weekly is another good preventative measure.

Emergency Showers

The emergency shower should deliver a pattern of water with a diameter of at least

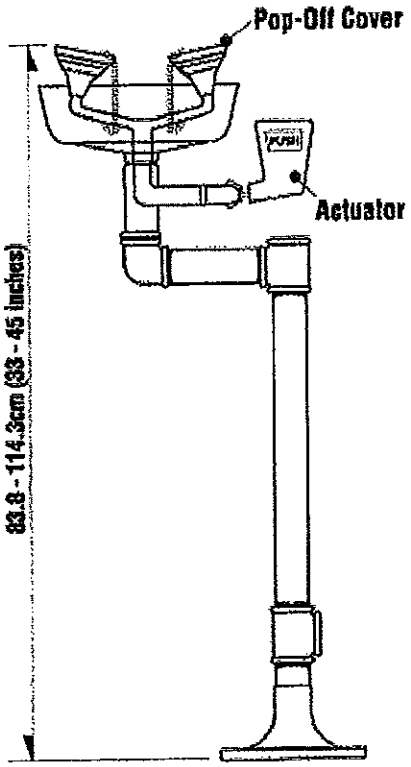
50.8 cm (20 inches) at 152 cm (60 inches). This diameter ensures that the water will come into contact with the entire body - not just the top of the person's head. ANSI also recommends the shower head be between 208.3 and 243.8 cm (82-96 inches) from the floor. The minimum volume of spray should be 75.7 litres/minute (20 gallons/minute) for a minimum time of 15 minutes.

The shower should also be designed so that it can be activated in less than 1 second, and it remains operational without the operator's hand on the valve (or lever, handle, etc.). This valve should not be more than 173.3 cm (69 inches) in height. If enclosures are used, ensure that there is an unobstructed area of 86.4 cm (34 inches) in diameter.



Eyewash and Eye/Face Wash Stations

Eyewash stations should be designed to deliver fluid to both eyes simultaneously at a volume of not less than 1.5 litres/minute (0.4 gallons/minute) for 15 minutes. However, the volume should not be at a velocity which may injure the eyes. The unit should be between 83.8 and 114.3 cm (33 to 45 inches) from the floor, and a minimum of 15.3 cm (6 inches) from the wall or nearest obstruction.



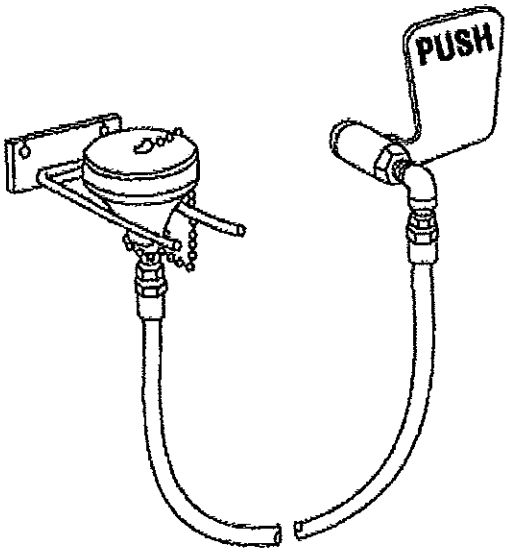
The user should be able to open their eyelids with their hands and still have their eyes in the liquid. As with the shower, the unit should also be designed so that it can be activated in less than 1 second, and it remains operational without the operator's hand on the valve (or lever, handle, etc.) with the valve being located in an easily located place. Since the nozzles to eyewash stations typically need to be protected from airborne contaminants, the units are to be designed such that the removal of these covers should not require a separate motion by the user when the unit is activated.

Personal Wash Stations

Designed to deliver flushing fluid immediately, personal wash stations can be used while transporting the victim to the permanent eyewash station or medical facility. These stations do not replace the requirement to have a 15 minute-supply eyewash station. The expiry date of the fluid should be printed permanently on the unit.

Drench Hoses

This type of equipment is usually considered to be secondary to proper emergency showers and eyewash stations (e.g., having a drench hose does not replace the need for showers/stations). Drench hoses may be used to "spot" rinse an area when a full shower is not required, to assist a victim when the victim is unable to stand or is unconscious, or to wash under a piece of clothing before the clothing is removed.



Combination Units

This name refers to equipment that shares a common plumbing fixture. Any of the fixtures such as shower, eyewash, eye/face wash or drench hose may be in this combination, but most commonly it refers to a shower and an eye wash station. It is important that pressure and volume requirements for each piece of the unit (as described above) are in compliance with the code.

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Where should the emergency equipment be located?

To be effective, the equipment has to be accessible. ANSI recommends that a person be able to reach the equipment in no more than 10 seconds. In practical terms, consider that the person who needs the equipment will be injured, and may not have use of their vision. Recommendations for this distance in linear terms range from 15 to 30 metres (50 to 100 feet).

However, the "10 second" rule may be modified depending on the potential effect of the chemical. Where a highly corrosive chemical is used, an emergency shower and eyewash station may be required within 3-6 metres (10-20 ft) from the hazard. These units should be installed in such a way that they do not become contaminated from corrosive chemicals used nearby.

The location of each emergency shower or eyewash station should be identified with a highly visible sign. The sign should be in the form of a symbol that does not require workers to have language skills to understand it. The location should be well lit.

Other recommendations include that the emergency shower or eyewash station should:

- be located as close to the hazard as possible
- not be separated by a partition from the hazardous work area.
- be on an unobstructed path between the workstation and the hazard. (Workers should not have to pass through doorways or weave through machinery or other obstacles to reach them.)
- be located where workers can easily see them - preferably in a normal traffic pattern.
- be on the same floor as the hazard (no stairs to travel between the workstation and the emergency equipment)
- be located near an emergency exit where possible so that any responding emergency response personnel can reach the victim easily.
- be located in an area where further contamination will not occur
- provide a drainage system for the excess water (remember that the water may be considered a hazardous waste and special regulations may apply).
- not come into contact with any electrical equipment that may become a hazard when wet, and
- be protected from freezing when installing emergency equipment outdoors.

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What temperature should the water be?

The 2004 ANSI standard recommends that the water should be "tepid" but does not give a specific temperature. Other sources will use the term "lukewarm water". ANSI does provide a guideline that the water temperature should be under 38°C (100°F) and above 15.5°C (60°F). Temperatures higher than 38°C (100°F) are harmful to the eyes and can enhance chemical interaction with the skin and eyes. Long flushing times with cold water (less than 15.5°C (60°F) can cause hypothermia and may result in not rinsing or showering for the full recommended time (ANSI 2004). With thermal burns (injuries to the skin), the American Heart Association noted that optimal healing and lowest mortality rates are with water temperatures of 20-25°C (68-77°F).

Remember that any chemical splash should be rinsed for a minimum of 15 minutes but rinsing time can be up to 60 minutes. The temperature of the water should be one that can be tolerated for the required length of time. Water that is too cold or too hot will inhibit workers from rinsing or showering as long as they should.

Install anti-scalding devices (temperature control valve or thermostatic tempering valve), constant flow meters, and other devices that will help maintain a constant

temperature and flow rate. For cold or outdoor locations, emergency showers with heated plumbing are available. In hot climates, outdoor emergency showers should also have a tempering valve so that workers are not exposed to water that is too hot.

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What are examples of areas that may require this equipment?

Work areas and operations that may require these devices include:

- battery charging areas,
- laboratories,
- spraying operations,
- high dust areas,
- dipping operations, and
- hazardous substances dispensing areas.

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What other factors should I consider when selecting and using this type of emergency equipment?

The following factors should also be considered as part of a hazard analysis when decisions are being made about the selection and use of emergency showers, eyewash stations or combination units:

Potentially hazardous substances in the immediate work area

All hazardous substances need to be properly identified. A review of MSDSs and labels can help to evaluate the hazard. To select the appropriate eyewash and shower equipment, you must know about the chemicals you use and their potential risks!

Number of workers in an area with a hazardous substance

More than one emergency shower or eyewash station may be required in an area where many workers use hazardous substances. Evaluate how many workers are using the hazardous chemicals, and provide more equipment where necessary to ensure the each worker's protection.

Isolated workers

The installation of an audible or visual alarm can alert other workers when the emergency shower or eyewash station is being used. An alarm is especially important if only one worker happens to be working in that area. A victim may need help in getting to the eyewash if temporarily blinded. Some companies connect valves electrically to warning lights or buzzers in central areas.

Comfort and warmth

Extra overalls and foot covers should be stored near emergency showers. Clothes contaminated with corrosive or toxic chemicals need to be removed from the injured person. Consider installing a privacy curtain (but remember to maintain the 'obstacle free' diameter dimension as stated in the ANSI standard.)

Quality of the Flushing Fluid

Changing the fluid in self-contained systems frequently and cleaning the units regularly can prevent inadvertent use of contaminated fluid. Refer to the manufacturer's instructions for further details. Even in plumbed eyewash stations, the water may contain contaminants such as rust, scale and chemicals. Systems should be flushed and cleaned regularly.

Neutralized Solutions

Eyewash bottles and some portable units cannot supply enough fluid to adequately dilute and wash away contaminants. The use of buffered solutions can improve the efficiency of the portable eyewash because these solutions can increase the first aid potential of the small amount of fluid, and can partially neutralize the contaminant.

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Are there any limitations I should be aware of?

Plumbed Emergency Showers and Eyewash Stations

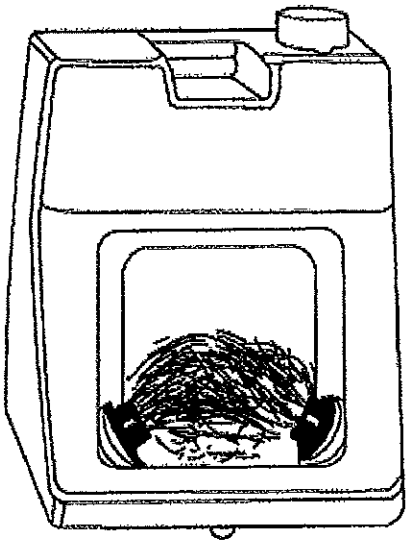
Studies have shown that despite the 15-minute flushing requirement, users usually flush exposed body parts five minutes or less. The reasons were always related to the extreme discomfort users experienced using cold water. In cold climates the water temperature in indoor plumbed systems can be in the 2-7°C (35-45°F) range.

Also, drinkable tap water may not provide the best flushing solution. Tap water may contain many contaminants and could aggravate the injured body part. Some municipal water supplies also contain chlorine which can irritate and leach salt from the eye tissue. As well, tap water may contain rust, scale and chemicals. Running the water continually keeps the water line fresh. Plumbed emergency eyewash stations should use water that is periodically tested and treated to remove chemical contaminants.

Portable, Self-Contained Eyewash Stations

Portable, self-contained eyewash stations have a limited amount of fluid. As a result, maintenance is critical to ensure that units are fully charged at all times.

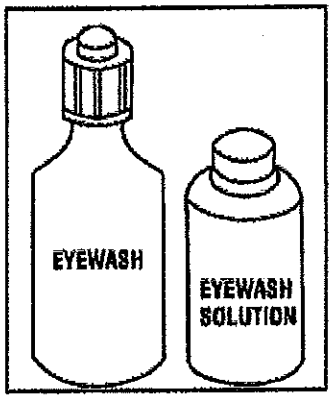
These eyewash stations also require ongoing maintenance of the buffered saline solution. The agents used to control bacterial growth are effective for certain limited periods of time. Also, small amoebae capable of causing serious eye infections have been found in portable and stationary eyewash stations. Consequently it is important to monitor the shelf life of the solution and replace the solution when it has expired.



Eyewash Bottles

Eyewash bottles or personal eyewash units supplement plumbed and self-contained stations, but in no way can replace them. They are portable and permit immediate flushing of contaminants or small particles. However, eyewash bottles are very difficult for the user to handle, especially when alone and when both eyes have been exposed. (e.g., holding the eyelids open while handling the unit is awkward). Also, one bottle cannot flush both eyes simultaneously. Since the fluid supply lasts for only a short period of time, the bottle may not able to wash the eyes sufficiently.

The main purpose of such a unit is to supply immediate flushing. Once accomplished, the user should proceed to a self-contained or plumbed eyewash and flush for the required flushing/ rinsing period.



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When should equipment be inspected and maintained?

One worker in the work area should be designated responsible for inspecting and operating (activating) the emergency shower, eyewash station, combination units, and drench hoses weekly. A weekly check will make sure that there is flushing fluid available as well as clear the supply line of sediments and minimize microbial contamination caused by 'still' or sitting water. This worker should keep a signed, dated record. The ANSI standard also recommends a complete inspection on an annual (yearly) basis.

Preventive maintenance inspections should be done every six months to check for such problems as valve leakage, clogged openings and lines, and adequacy of the fluid volume. A work record of these inspections should be kept. Replacement parts should be kept on hand to prevent the system from becoming non-functional. If the system breaks down for any reason, the workers in the area should be properly warned and protected.

Personal eyewash equipment should be inspected and maintained according to the manufacturer's instructions and at least annually for overall operation.

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What type of training should the workers receive?

All workers require instruction in the proper use and location of emergency showers or eyewash stations before any emergencies occur. It should never be assumed that workers are already aware of the proper procedures. Written instructions should be made available to all workers and posted beside the emergency shower and eyewash station. Part of the instructional process should include a "hands-on" drill on how to find equipment.

The wearing of contact lenses can be dangerous because chemicals can become trapped under a contact lens. Any delays caused by removing contact lenses in order to rinse eyes could result in injury. Training should include instruction in contact lens removal.

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Document last updated on June 16, 2005

EMERGENCY EYE WASH

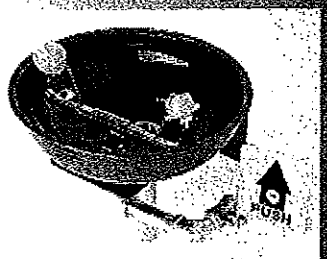
#4100

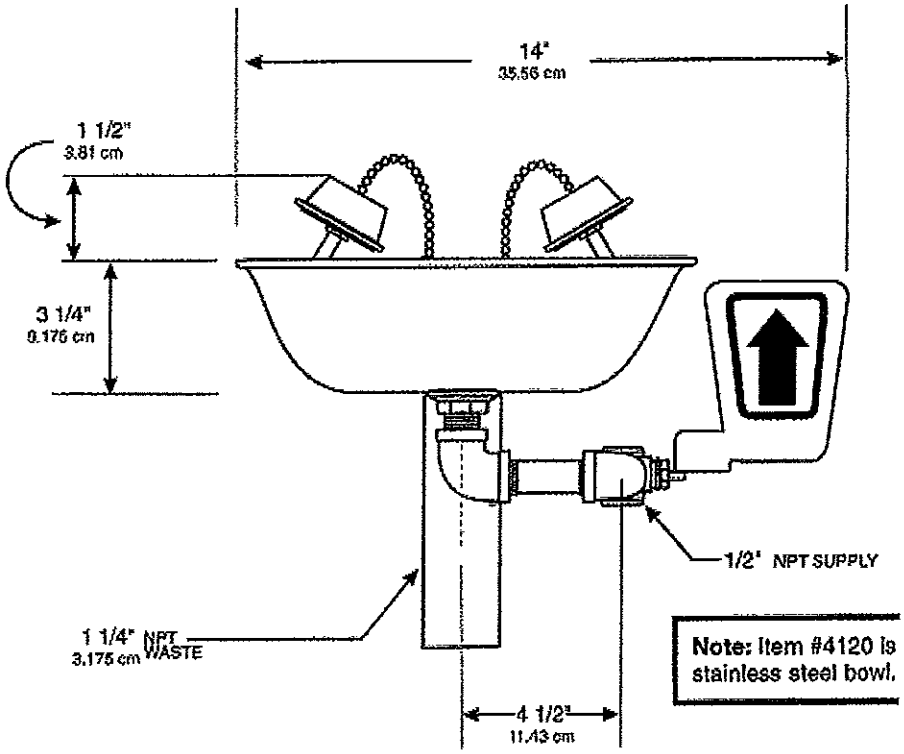
This rugged unit attaches to wall to provide emergency eye and face flush. Bowl is manufactured from high quality ABS plastic and includes zinc-coated parts. Dust covers automatically release when water pressure is applied to shower heads.

Other features include:

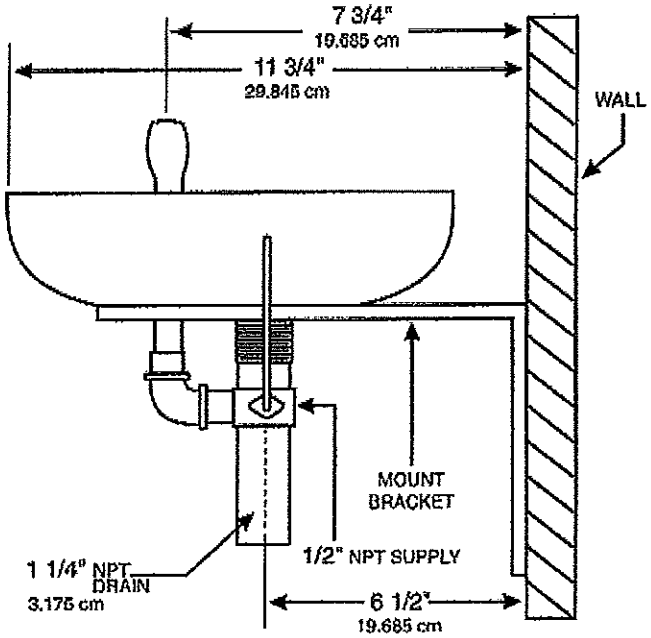
- Flow rate – @ 30 PSI 3.2 GPM
- Shower heads – two soft spray outlet heads with float-off dust covers
- Drain bowl – rugged ABS plastic
- Operation valve – 1/2" NPT stay-open ball valve remains open until physically shut
- Spray Control Unit has a pressure compensation system to assure even, smooth flow
- Supply – 1 1/4" O.D. tailpiece
- Compliance – ANSI Z358.1-1998
- Includes emergency sign & inspection tag

All units meet OSHA requirements and are in accordance with ANSI standards. Check all eyewash stations weekly for proper operation.





Note: Item #4120 is stainless steel bowl.



Notice: All models shown meet ANSI Standard and OSHA rules and regulations relating to this type of product. Units should be tested regularly. Continued product improvements make specifications subject to change without notice.